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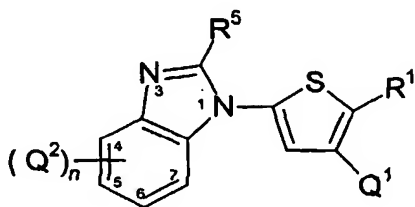
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: THIOPHENE COMPOUNDS



(I)

(57) Abstract: The present invention provides compounds of formula (I): (I) pharmaceutical compositions containing the same, processes for preparing the same and their use as pharmaceutical agents.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 24272

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C07D409/04 C07D409/14 C07D491/04 A61K31/4184 A61P35/00
 //(C07D491/04,319:00,235:00),(C07D491/04,321:00,235:00)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C07D A61K A61P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, BEILSTEIN Data, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00 12089 A (HUNGATE RANDALL W ;KOESTER TIMOTHY J (US); BILODEAU MARK T (US); M) 9 March 2000 (2000-03-09) page 46; claims	1,21
A	WO 01 00587 A (RAHMAN SHAHZAD SHAROOQ ;SMITHKLINE BEECHAM PLC (GB); FARINA CARLO) 4 January 2001 (2001-01-04) claims	1,21
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *Z* document member of the same patent family

Date of the actual completion of the international search

27 November 2003

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US/24272

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>CORRAL C. ET AL: "Reactions of methyl 3-hydroxythiophene-2-carboxylate. Synthesis of methyl 5-azoly-3-hydroxythiophene-2-carboxylates "</p> <p>JOURNAL OF HETEROCYCLIC CHEMISTRY, vol. 24, no. 5, 1987, pages 1301-1303, XP002263093 PROVO US the whole article, particularly schemes 1,2 and page 1302, compound nr. 11 -----</p>	1, 30

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 03/24272

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
Although claims 24-29, 34-36 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 24272

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0012089	A	09-03-2000	AU 760020 B2	08-05-2003
			AU 3078999 A	21-03-2000
			CA 2341409 A1	09-03-2000
			EP 1109555 A1	27-06-2001
			JP 2002523459 T	30-07-2002
			WO 0012089 A1	09-03-2000
			US 6162804 A	19-12-2000
			US 6465484 B1	15-10-2002
WO 0100587	A	04-01-2001	AU 6152200 A	31-01-2001
			WO 0100587 A1	04-01-2001
			EP 1187813 A1	20-03-2002
			JP 2003503390 T	28-01-2003